Digital Multi-Meter
WD-751A

Instruction Manual

VIZ Test Instrument

VIZ Mfg. Co. 335 E. Price St. Phila., Pa. 19144

Price 50 Cents

Safety Precaution

For proper operation, the ground (black) lead of the WD-751A should be connected to the ground of the equipment under test before any other connections are made. An important point to remember is that there is always danger inherent in testing electrical equipment. Therefore, the operator should thoroughly familiarize himself with the equipment under test before working on it, bearing in mind that high voltages may appear at unexpected points in defective equipment. Additional precautions which experience in the industry has shown to be important are listed below:

1. Always use an isolation transformer, such as the VIZ WP-25A, WP-26A or WP-27A Isotap, when working with AC/DC equipment having the chasis connected directly to one side of the AC power line. (Use the Isotap sockets marked "ISOLATED" for this purpose)

2. It is good practice to remove power before connecting test leads to high-voltage points. If this is impractical, be especially careful to avoid accidental contact with equipment racks and other objects which can provide a ground. Working with one hand in your pocket and standing on a properly insulated floor lessens the danger of shock.

3. Filter capacitors may store a change large enough to be lethal. Therefore, dischange filter capacitors before attaching test leads.

4. Remember that leads with broken insulation provide the additional hazard of high voltages appearing at exposed points along the leads. Check test leads for frayed or broken insulation before working with them.

5. To lessen the danger of accidental shock, disconnect test leads immediately after test is completed.

6. Remember that the risk of severe shock is only one of the possible hazards. Even a minor shock can place the operator in jeopardy of more serious risks, such as a bad fall or contact with a source of higher voltage.

7. The experienced operator continuously guards injury and does not work on hazardous circuits unless another person is available to assist in case of accident.

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WD-751A
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1. DESCRIPTION

The **WD-751A** Digital VOM is a high-quality electronic multimeter that utilizes a 3-1/2 digit Field Effect type Liquid Crystal for its display. The **WD-751A** can be operated by its internal Battery supply or from the AC line using the adapter WG-488 listed under "Accessories (Optional)" page 6. The liquid crystal coupled with its unique CMOS LSI (large scale intergration) circuit results in this instrument having extremely low power consumption (300 mw) and long battery life. One set of four alkaline penlite "AA" cells will render over 30 hours of continuous use. The black numerals against the gold background of the field effect liquid crystal display gives sharp, strong readings under a wide range of ambient light.

A crystal oscillator is used in the clock pulse generator of the A to D convertor which permits stable measurements, without being affected by internally or externally generated noise. The **WD-751A** is a semi-auto-ranging unit designed for fast easy operation. Extra care has been taken in the design of the **WD-751A** that enables it to continue functioning even though subjected to momentary accidental overloading.

The rugged ABS plastic case coupled with its compact size and light weight makes the **WD-751A** ideal for portable operation.

2. SPECIFICATIONS

(1) GENERAL

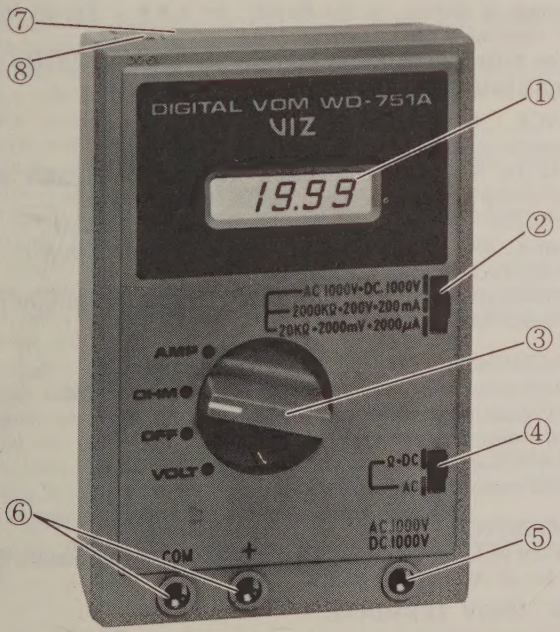
1. **Operation principle**: Intergrated circuit.
2. **Display**: liquid Crystal Display (F.E type)
   Max. display: 1999 (except AC/DC 1000V.)
3. **Range selection**: Semi-Automatic
4. **Automatic over-range indication**: Indicated by ▶▶
5. **Polarity indication**: Reverse polarity is indicated by –000
6. **Battery check**: Weak battery is indicated by [B▷] in lower left of display.
7. **Response time**: DC, Ω : Approx. 0.5 sec.
   AC : Approx. 2 sec.
8. **Sample rate**: 2 times/sec.
9. **Operating temperature and humidity**: 0°C to 40°C. Under 85% RH.
10. **Temperature and humidity**: 23°C +/–5°C.
    Conditions for optimum use: Under 80% RH.
11. **Temperature characteristic**: DC 2000mV, 20KΩ – Less than 150PPM/°C of F.S.
    AC 2000mV, AC, DC 2000μA – Less than 200PPM/°C of F.S.
12. **Power consumption**: 0.3W (Continuous use: Approx 30 hrs with alkaline battery).
13. **Power source**: Uses 4 penlite "AA" cells or AC Adapter WG-488 (6V DC)
14. **Breakdown voltage**: Between case and Input terminal or AC adapter terminal: AC 15000V for max. 1 min.
15. **Dimensions**: Height 6" (151mm)
    Width 3-1/8" (100mm)
    Depth 1-3/4" (44mm)
16. **Shipping weight**: Approx. 1.034 pouns (470 gms)
17. **Accessories**: (Included)
    1 fuse (0.5A), 1 spare fuse (in battery case), 1 set test leads (red and black, banana type)
    (optional)
    Carrying case, WG-461A and AC adapter WG-488.

(2) PERFORMANCE CHARACTERISTICS

Func-tin	Range	Accuracy	Approx. Internal Resistance	Remarks
DC.V	200, 2000mV	±0.3%rdg. ±0.1%f.s. ± 1 dgt.	5 MΩ	200, 2000mV Auto range
	20, 200V	±0.5%rdg. ±0.1%f.s. ± 1 dgt.	5 MΩ	20, 200V Auto range
	200V	±1.5%rdg. ±0.5%f.s. ± 1 dgt.	10MΩ	Ext. terminal 200, 1000V
	1000V	±1.5%rdg. ±0.1%f.s. ± 1 dgt.	10MΩ	Auto range
AC.V	200mV	±0.3%rdg. ±1.0%f.s. ± 1 dgt. (40Hz～1 KHz) ±1.0%rdg. ±1.0%f.s. ± 1 dgt. (1～10KHz)	5 MΩ	200, 2000mV Auto range
	2000mV	±0.3%rdg. ±0.2%f.s. ± 1 dgt. (40Hz～1 KHz) ±1.0%rdg. ±0.2%f.s. ± 1 dgt. (1～10KHz)	5 MΩ	
	20V	±0.8%rdg. ±0.7%f.s. ± 1 dgt. (40Hz～1 KHz)	5 MΩ	20, 200V Auto range
	200V	±0.8%rdg. ±0.7%f.s. ± 1 dgt. (400～500Hz)	5 MΩ	
	200V	±1.7%rdg. ±0.8%f.s. ± 1 dgt. (40～500Hz)	10MΩ	200, 500V Auto range
	500V	±1.7%rdg. ±0.3%f.s. 1 dgt. (40Hz～500Hz)	10MΩ	Ext. terminal
DC.A	200, 2000μA	±1.0%rdg. ±0.1%f.s. ± 1 dgt.	1 KΩ	200, 2000μA Auto range
	20, 200mA	±0.1%rdg. ±0.1%f.s. ± 1 dgt.	10Ω	20, 200mA Auto range
AC.A	200μA	±1.3%rdg. ±1.0%f.s. ± 1 dgt. (40Hz～1 KHz)	1 KΩ	200, 2000μA Auto range
	2000μA	±1.3%rdg. ±0.2%f.s. ± 1 dgt. (40Hz～1 KHz)	1 KΩ	
	20, 200mA	±1.3%rdg. ±0.7%f.s. ± 1 dgt. (40Hz～1 KHz)	10Ω	20, 200mA Auto range
OHM	2, 20KΩ	±0.5%rdg. ±0.1%f.s. ± 1 dgt.	0.1mA	2, 20KΩ Auto range
	200, 2000KΩ	±0.7%rdg. ±0.1%f.s. ± 1 dgt.	1 μA	200, 2000KΩ Auto range

- Full Scale of DC 1000V and AC 1000V is 2000V.
- AC Voltage and AC Current is the rectifier average value (RMS).

3. EXPLANATION OF PANEL LAYOUT



1. Display
2. Range switch
3. Function switch
4. AC-DC slide switch
5. AC/DC 1000V terminal
6. Input terminal
7. Battery case lid
8. AC Adapter terminal

(1) DISPLAY

- 3.5 digits, Maximum count ⌜1999⌟ (Except DC 1000V, AC 1000V)
- Automatic decimal set-up
- Reverse polarity is indicated by ⌜−000⌟.
- Over-voltage is shown, on the display, by a ▶▶, except when the 1000V terminal is used.
- When the battery voltage falls below a safe value, the display will indicate [B]. All batteries should be replaced at that time.

(2) ⌜RANGE⌟ SWITCH

- Range switch settings:
  - For AC/DC Voltage measurements from 200V to 1000V set slide switch to top position marked "AC/DC 1000V"
  - For AC/DC Voltage measurements from 2000mv to 200V; resistance, 200 KΩ to 2000 KΩ AC/DC current 200μA to 200mA set slide switch to center position.
  - For measurements below 20 KΩ 2000mV or 2000μA AC/DC set slide switch to bottom position.

(3) ⌜FUNCTION⌟ SWITCH

This switch is for selection of Voltage, Current and OHMS.
AC/DC Voltage measurement ... ⌜VOLT⌟
AC/DC Current measurement ... ⌜AMP⌟
RESISTANCE measurement ..... ⌜OHM⌟
Set to OFF position when not in use.

(4) AC-DC SWITCH

Slide to top position for DC and RESISTANCE measurements. Slide to bottom for all AC measurements.

(5) AC/DC 1000V TERMINAL

Insert the red test lead into this terminal for Voltage measurements over 200V (AC & DC). Semi-Automatic range also works when this terminal is used. For example, when the Voltage is under 200V (194.5 in this case), the indication will be 194.5 and not 200.

(6) INPUT TERMINALS

Insert the black test lead into COM. Insert the red test lead into +.

(7) BATTERY CASE

Use 4 penlite "AA" batteries. Observe proper polarity when installing batteries. (See Fig. 1, Fig. 2)
A fuse for the protection of Current measurement, and a spare fuse are installed in the battery case.

(8) **AC ADAPTER TERMINAL**
To be used with VIZ type WG-488 120V AC to 6V DC adapter.

4. OPERATION

(1) Make sure that Function switch, Range switch, etc. are properly set before taking measurments.
(2) When the value of a Voltage or Current to be measured is unknown, always select the highest range first. Then chose a suitable lower range if needed.
(3) Remove test leads from circuit when changing ranges.
(4) Operating temperature: 0°C to +40°C and humidity 85% RH or below. Care should be taken not to store this instrument in an excessively hot area, or expose the unit to unnecessary shock or vibration.
(5) The entire case and function selector knob are molded of ABS plastic which is extremely rugged and scratch/stain resistant. The input jacks are recessed to provide safe operation when the input leads are connected.
(6) Keep hands clear of the AC/DC 1000V terminal when not in use because this can cause a disturbance or error in the display reading.
(7) In order to get optimum performance from your WD-751A, care should be exercised while making measurements. Insure proble connectors are firmly seated to input jacks and that the probe tips are free from grease solder-flux or other foreign materials. Do not touch readout window while making measurements.
(8) When the WD-751A is not in use, always set the function switch to OFF.

***Use of the WG-488 AC adapter**

Insert the connector of the WG-488 to the 6V DC input located on the top left of the WD-751A. When the WG-488 is used the internal Battery supply is automatically disconnected. To revert to battery operation, simply remove the WG-488 connector from the unit.
When using the WG-488 care should be taken when measuring voltages that exceed 200V with respect to ground. Always make sure that the COM terminal is connected to the ground (–) polarity to assure that the reading is not affected by an induced current.
The WG-488 should not be used when the ground voltage is unknown.

5 OPERATION

(1) DC V (0–200V) MEASUREMENT

1. Insert the red test lead into the "+" terminal and black test lead into the "COM" terminal.
2. Set the function switch to VOLT.
3. Set the AC-DC slide switch to DC/Ω.
4. Set the Range switch to the proper position.
   Bottom position for 200mV, 2000mV.
   Middle position for 20V, 20V.
5. Connect the test leads to the measuring point. The display is set automatically to the proper range and decimal moves automatically to the proper position.

(2) DC HIGH V (200–1000V) MEASUREMENT

1. Insert the red test read into the AC/DC 1000V terminal and the black test lead into the COM terminal.
2. Set the Function switch and AC-DC slide switch in the same manner as DC V (0–200V) measurements.
3. Set the range switch to the top position.

(3) AC mV, V (0–200V) MEASUREMENT

1. Insert the test leads into the + and COM terminals.
2. Set the Function switch to VOLT.
3. Set the AC-DC slide switch to AC.
4. Set the Range switch in the same manner as the DC V measurements. The display is set automatically to the proper range and decimal moves automatically to the proper position.

(4) AC HIGH V (200–1000V) MEASUREMENT

1. Insert one test lead to the COM terminal and the other to the AC 1000V terminal.
2. Set the Function switch and AC-Dc slide switch in the same manner as the AC V measurement.

(5) DC μA, mA MEASUREMENT

1. Insert the red test lead into the + terminal and the black test lead into the COM terminal.
2. Set the Function switch to AMP.
3. Set the AC-DC slide switch to DC/Ω.
4. Set the Range switch to the proper position
   Bottom position for measurements from 200μA, 2000μA.
   Middle position for measurements from 20mA, 200mA.
5. Connect the test leads to the measuring point. The display is set automatically to the proper range and decimal moves automatically to the proper position.

(NOTE)

1. When taking Current measurements, be careful that Voltage is not applied to these ranges by mistake.
2. When taking Current measurements.
   (1) Keep the WD-751A 1 (2–3 cm) away from any grounded surfaces.
   (2) Be certain to ground the COM terminal of the object to be measured to the ground voltage source.

(6) AC μA, mA MEASUREMENT

Set the AC-DC slide switch to AC and take the same steps as DC μA, mA measurements.

(7) RESISTANCE MEASUREMENT (KΩ)

1. Insert the test leads into the + and COM terminals.
2. Set the Function switch to OHM.
3. Set the AC-DC slide switch th to DC/Ω.
4. Set the Range switch to the proper position.
   Bottom position for 2KΩ, 20KΩ.
   Middle position for 200KΩ, 2000KΩ.
5. Connect the test leads to the measuring point. The display is set automatically to the proper range and decimal moves automatically to the proper position.

(NOTE)

1. When taking RESISTANCE measurements.
   The power should be removed from the equipment under test, and any capacitors should be discharged so that no voltages are present in them.
2. A current flows between terminals during RESISTANCE measurements. This current travels from the "–" terminal to the "+" terminal.
3. See Item 2 (Performance characteristics) for Internal resistance and Output current.

6. OVERLOAD PROTECTION

DC. AC V (0–200)	: up to 500V DC or AC during a maximum of one minute.
DC. 1000V	: up to 1200V DC or 600V AC during a maximum of one minute.
AC. 1000V	: up to 1000V AC or 500V DC during a maximum of one minute.

2, 20KΩ	: up to 200V DC or 150V AC during a maximum of one minute.
200, 2000KΩ	: up to 200V DC or 150V AC during a maximum of one minute.
DC. AC 20, 200mA	: up to 450mA DC or AC during a maximum of one minute.
DC. AC 20, 2000μA	: up to 45mA DC or AC during a maximum of one minute.

(NOTE)

Be careful that voltages in ranges listed above are not exceeded since this might damage the circuitry or create a shock hazard. Be especially careful when taking RESISTANCE or CURRENT measurements, that a voltage is not applied to the Input terminals.

7. BATTERY & FUSE REPLACEMENT

(1) Press the area labeled "OPEN" (see Fig. 1) on the lid of the battery case lightly and slide toward the direction of arrow to open case.
(2) Insert 4 penlite "AA" type bateries as shown in Fig. 2. observe proper polarity.
(3) If the fuse burns out, replace it with the spare fuse provided. Replace only with 0.5A glass fuse which is available at most Electronic Distributors.

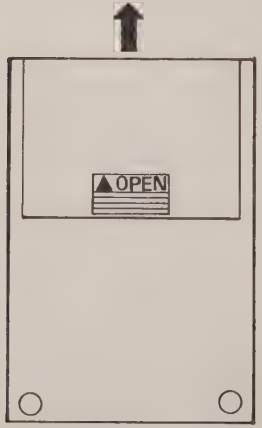


Fig. 1

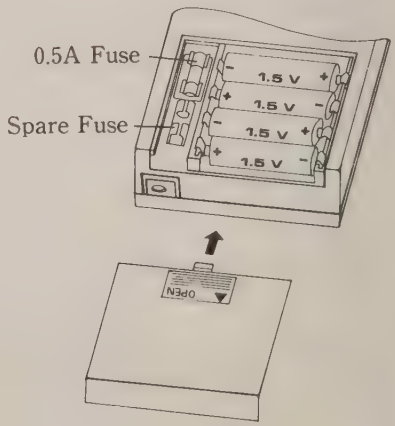


Fig. 2

REPLACEMENT PARTS LIST

Symbol	Description		Q'ty	VIZ Stock #
C-1	Condenser (Ceramic)	0.01uF 1000V	1	9181-041
C-3	Condenser (Styrene)	15pF 125V	1	9181-042
C-4	Condenser (Ceramic)	220PF 50V	1	9181-043
C-5	Condenser (Ceramic)	2pF 50V	1	9181-044
C-6	Condenser (Ceramic)	0.1uF 25V	1	9181-045
C-9	Condenser (Alum. Electrolytic)	10uF 16V	1	9181-046
C-10	Condenser (Non polarity Alum. Electrolytic)	4.7uF 16V	1	9181-047
C-11	Condenser (Polyesters film)	0.47uF 50V	1	9181-048
C-13	Condenser (Ceramic)	68pF 50V	1	9181-049
C-14	Condenser (Ceramic)	470pF 50V	1	9181-051
C-15	Condenser (Polyesters film)	0.033uF 50V	1	9181-052
C-16	Condenser (Ceramic)	39pF 50V	1	9181-053
C-17	Condenser (Ceramic)	0.1uF 25V	1	9181-045
C-18	Condenser (Ceramic)	39pF 50V	1	9181-053
C-19	Condenser (Ceramic)	470pF 50V	1	9181-051
C-20,21,22, 23,24,25	Condenser (Ceramic)	39pF 50V	6	9181-053
C-26	Condenser (Ceramic)	390pF 50V	1	9181-058
C-27	Condenser (Ceramic)	0.1uF 25V	1	9181-045
C-28,29	Condenser (Alum. Electrolytic)	47uF 10V	2	9181-061
C-30	Condenser (Ceramic)	0.1uF 25V	1	9181-045
C-31	Condenser (Alum. Electrolytic)	47uF 16V	1	9181-063
C-32	Condenser (Ceramic)	0.1uF 25V	1	9181-045
C-33	Condenser (Alum. Electrolytic)	220uF 10V	1	9181-065
C-34	Condenser (Alum. Electrolytic)	47uF 10V	1	9181-066
C-35	Condenser (Ceramic)	0.1uF 25V	1	9181-045
C-36	Condenser (Alum. Electrolytic)	220uF 10V	1	9181-065
C-37,38	Condenser (Alum. Electrolytic)	10uF 16V	2	9181-046
C-39	Condenser (Styrene)	15pF 125V	1	9181-042
C-40	Condenser (Styrene)	20pF 500V	1	9181-072
C-41	Condenser (Ceramic)	39pF 50V	1	9181-053
C-42	Condenser (Ceramic)	68pF 50V	1	9181-049
TR-1	Variable resistor	100K	1	9181-081
TR-2	Variable resistor	1M	1	9181-082
TR-3	Variable resistor	5K	1	9181-083
TR-4	Variable resistor	1.2K	1	9181-084
TR-5	Variable resistoe	2K	1	9181-085
TR-6	Variable resistor	30K	1	9181-086
TR-7	Variable resistor	300K	1	9181-087
TR-8	Variable resistor	1.5K	1	9181-088
TR-9	Variable resistor	2.6K	1	9181-089
TR-10,11	Variable resistor	1M	1	9181-082
TRC-1,2	Trimmer condenser	6pF Minimum.	2	9181-075

REPLACEMENT PARTS LIST, continued

Symbol	Description	Q'ty	VIZ Stock #
IC-1	OP amp CA3130T (RCA)	1	14-031305
IC-2 & 3	OP amp RC4558DN (RENZEON)	1	14-045585
IC-4	OP amp CA3130T (RCA)	1	14-031305
IC-5	OP amp upc157A (NEC)	1	14-001575
IC-6	CMOS-LSI 016C (SEIKO)	1	14-000165
IC-7	CMJS-LSI 015E (SEIKO)	1	14-000155
NR-1,2			
INV-1,2	CMOS GATE (One package) CD4001AE (RCA)	1	14-040015
ND-1,2,3,4	CMOS GATE (One package) CD4011AE (RCA)	1	14-040115
EX-1,2,3,4	CMOS GATE (One package) CD4070AE (RCA)	1	14-040705
Tr-1	Transistor P-N-P 2SA733 (NEC)	1	9181-021
Tr-2,3,4	Transistor N-P-N 2SC1311 (MITSUBISHI)	3	9181-022
Tr-5	Transistor N-Chan FET 2SK19GR (TOSHIBA)	1	9181-023
D-1,2	Zener diode RD3.9EB (NEC)	2	9181-024
D-3,4,5,6	Diode IS953 (NEC)	4	9181-025
D-7	Zener diode IN823A (K.H Electronics)	1	11-082301
D-8,9,10,11 &12,13,14	Diode IS953 (NEC)	7	9181-025
R-1	Resistor (Metal glaze) 1K +/−0.5% 1/4 watt	1	9181-027
R-2	Resistor (Metal film) 10Ω +1/−0.5% 1/4 watt	1	16-521000
R-3	Resistor (Solid type) 5.1M +/−0.5% 1/4 watt	1	16-575100
R-5	Resistor (Carbon film) 2.2M +/− 5% 1/4 watt	1	16-052250
R-6	Resistor (Carbon film) 5.1K +/− 5% 1/8 watt	1	16-025120
R-7	Resistor (Metal film) 30K +/− 1% 1/4 watt	1	16-553000
R-8	Resistor (Carbon film) 220K +/− 5% 1/2 watt	1	16-082240
R-9,10	Resistor (Carbon film) 1K +/− 5% 1/4 watt	2	16-501020
R-11	Resistor (Carbon film) 100K +/− 5% 1/8 watt	1	16-021040
R-12	Resistor (Carbon film) 20K +/− 5% 1/8 watt	1	16-022030
R-13	Resistor (Carbon film) 30Ω +/− 5% 1/8 watt	1	16-023000
R-14,15	Resistor (Carbon film) 200K +/− 5% 1/8 watt	2	16-022040
R-16	Resistor (Carbon film) 47K +/− 5% 1/8 watt	1	16-024730
R-17	Resistor (Metal film) 300K +/− 1% 1/4 watt	1	16-563000
R-18	Resistor (Metal film) 2.2K +/− 1% 1/4 watt	1	16-542200
R-19,20	Resistor (Metal film) 20Ω +/− 1% 1/4 watt	2	16-522000
R-21	Resistor (Carbon film) 200K +/− 5% 1/8 watt	1	16-022040
R-22,23,24	Resistor (Carbon film) 47K +/− 5% 1/8 watt	3	16-024730
R-25,26	Resistor (Carbon film) 200K +/− 5% 1/8 watt	2	16-022040
R-27	Resistor (Solid type) 10M +/− 5% 1/2 watt	1	9181-032
R-28	Resistor (Carbon film) 150Ω +/− 5% 1/8 watt	1	9181-033
R-30,31,33 34,35,36	Resistor (Carbon film) 200K +/− 5% 1/8 watt	6	16-022040
R-37	Resistor (Carbon film) 47K +/− 5% 1/8 watt	1	16-024730
R-38	Resistor (Carbon film) 200K +/− 5% 1/8 watt	1	16-022040
R-39	Resistor (Carbon film) 820K +/− 5% 1/4 watt	1	16-168240
R-40,41,42, 46	Resistor (Carbon film) 200K +/− 5% 1/4 watt	4	16-162040

Symbol	Description		Q'ty	VIZ Stock #
SW 1-4	Slide switch	3-points, 4-circuits	1	9181-101
SW 5-11	Rotary switch	3-points, 6-circuits	1	9181-102
SW 12-17	Slide switch	2-points, 6-circuits	1	9181-103
Res. network			1	9181-104
DC-DC converter		1	1	9181-105
Inductor			2	9181-106
Crystal resonator			1	9181-107
Jack for ADPT.			1	9181-108
Fuse holder			1 set	9181-109
Fuse	Glass type 0.5 Amps		1	9181-111
LC	Liquied Crystal Display		1	9181-112
PCB	Print circuit board		1	9181-113
Soldercon Terminal (For LCD)			1 set	9181-114
BT-1	Battery terminal Type 2C		3	9181-115
BT-2	Battery terminal Type CR		1	9181-116
BT-3	Battery terminal Type CL		1	9181-117

Symbol	Description	Q'ty	VIZ Stock #
FP-1	Front panel (VIZ Blue ABS plastic) with silk printed & Terminals	1	9181-006
BC-1	Back case (VIZ Blue ABS plastic)	1	9181-007
BC-2	Battery cover (VIZ Blue ABS plastic)	1	9181-008
KB-1	Rotary knob.	1	9181-009
SC-1A	Shield case	1	9181-011
SC-2B	Shield case	1	9181-012
FT-1	Rubber foot	2	9181-013

VIZ Repair Service

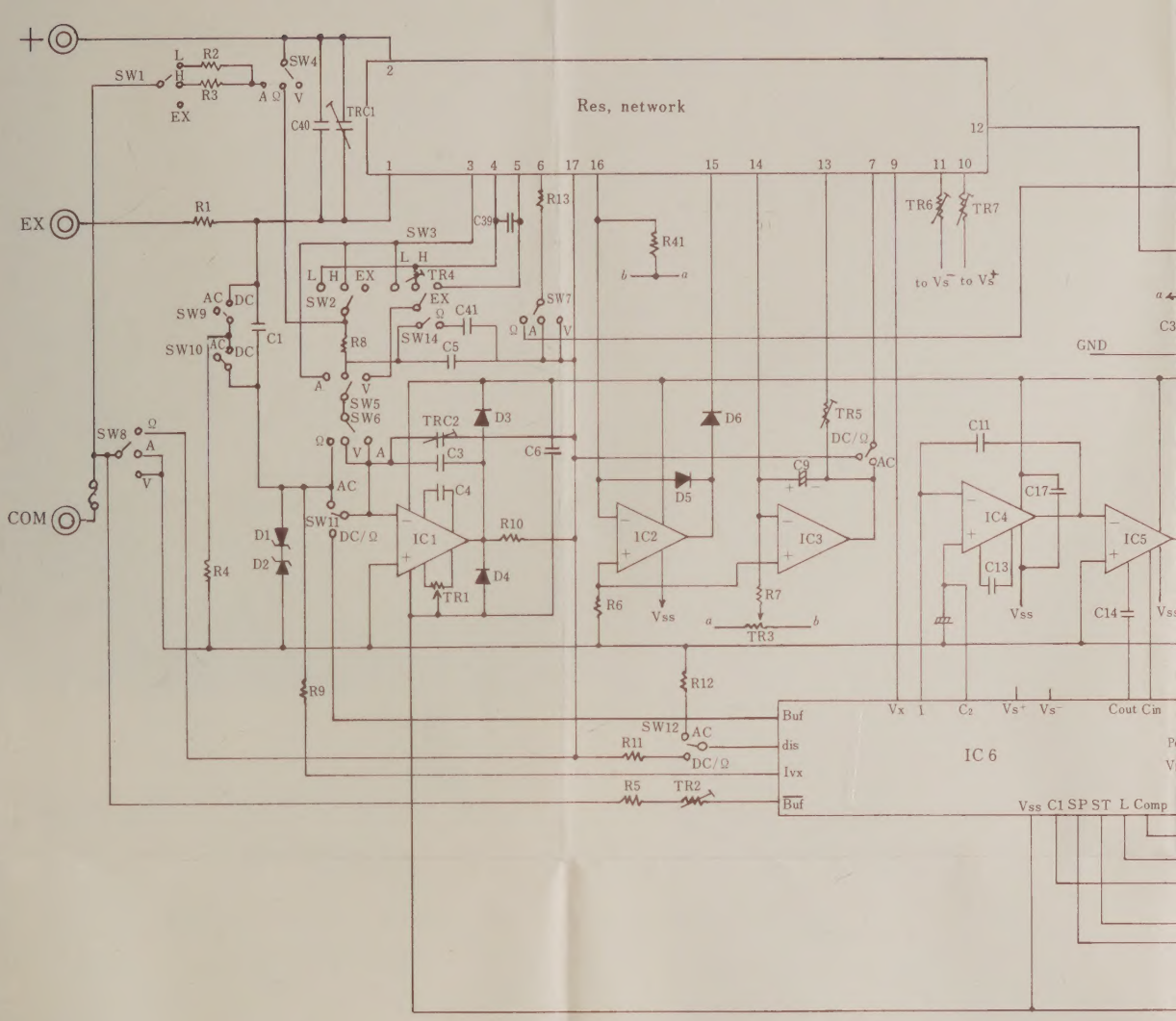
Authroized VIZ Service Depots throughout the United States are available for repair and calibration of VIZ Test Instruments. For up-to-date listings of these Depots, contact your VIZ Distributor, or write to VIZ Mfg. Co. 335 E. Price St. Phila Pa. 19144.

If it becomes necessary to service this equipment, fill out one of the Test Equipment Service order forms supplied with the instrument. It is important that:

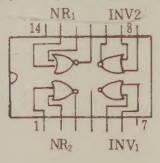
1. Test equipment be packed carefully. The instrument should be double-packed. It is best to pack the unit in its original carton, or similar container, then "float" this carton in at least a 3-inch layer of shredded paper inside the outer carton.
2. A full description of the trouble be included in the report.
3. All probes, cables, and test leads used with the equipment be included in the shipment.

Attention to these detailes will help prevent damage in transit and delay in repairs.

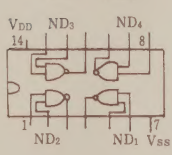
VIZ Mfg Co. 335 E. Price St. Phila. Pa. 19144



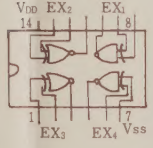
NR1, NR2, INV1, INV2



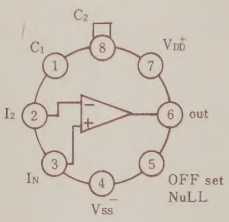
ND1 ~ ND4

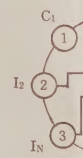


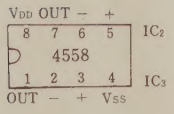
EX1 ~ EX4



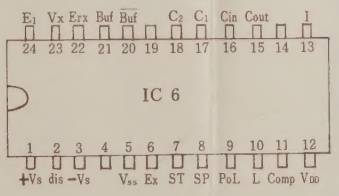
IC1, IC2

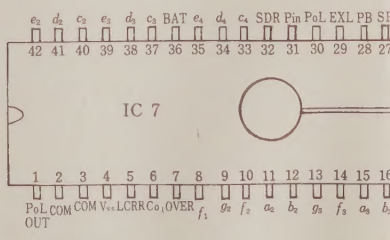




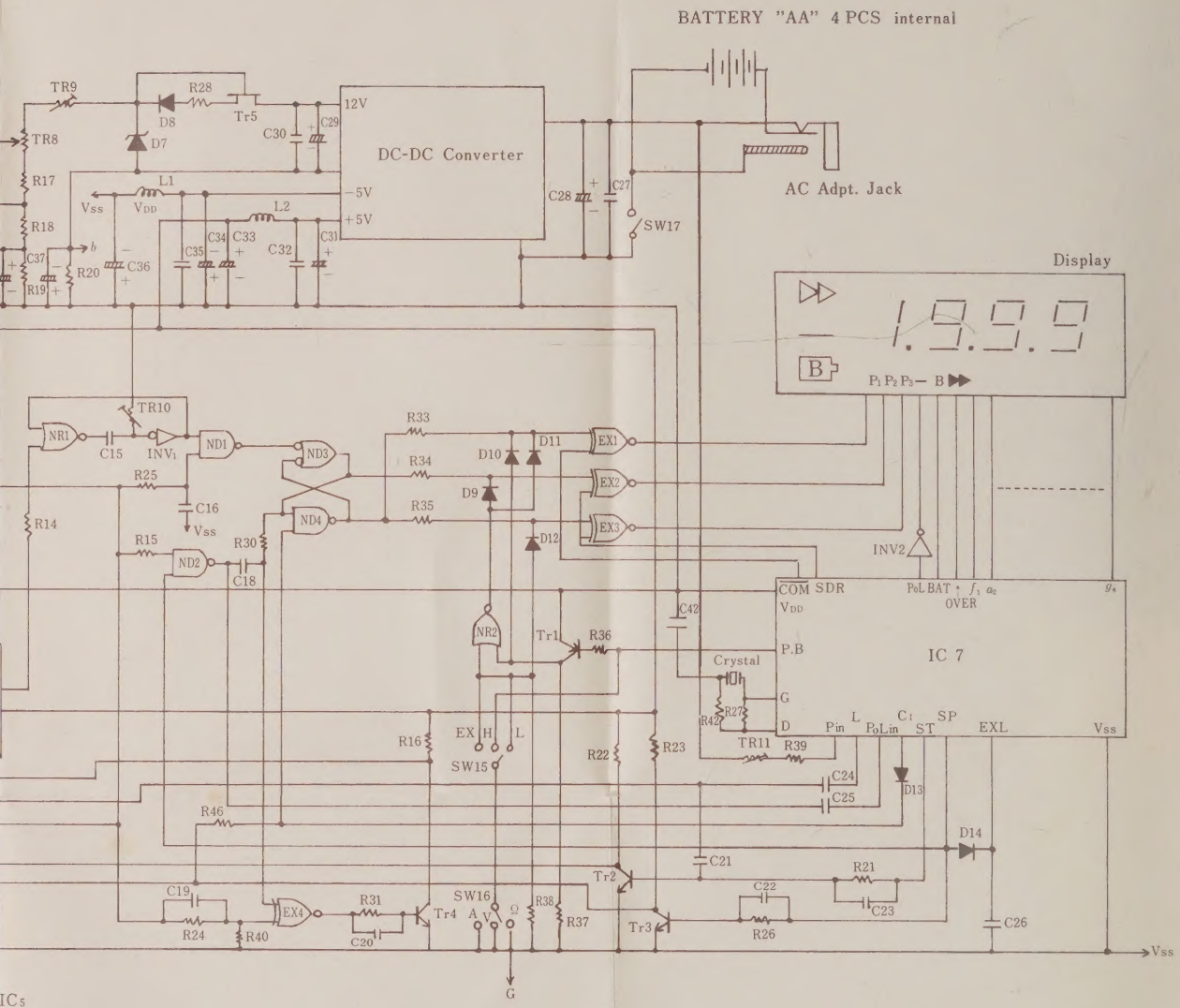


IC2, IC3





—— SCHEMATI


BATTERY "AA" 4 PCS internal
DC-DC Converter
12V
−5V
+5V
AC Adpt. Jack
SW17
Display
IC 7
COM SDR
VDD
P.B
Crystal
G
D
Pin
L
Ct
SP
ST
EXL
Vss
OVER
BAT
INV2
TR9
TR8
TR10
TR11
Tr1
Tr2
Tr3
Tr4
Tr5
D7
D8
D9
D10
D11
D12
D13
D14
R14
R15
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R38
R39
R40
R42
R46
C15
C16
C18
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C31
C32
C33
C34
C35
C36
C37
C42
L1
L2
NR1
NR2
ND1
ND2
ND3
ND4
INV1
EX1
EX2
EX3
EX4
SW15
SW16
IC5
OFF set NuLL
Res, network
DC − DC Converter
L C
Display TOP VIEW
Crystal resonator
To GND. terminal of case.
To G. D
Bottom View

DIAGRAM——